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Discussion Paper 190

Social Learning, Neighborhood Effects, and Investment in Human Capital: Evidence from Green-Revolution India

Futoshi Yamauchi

This paper shows that neighborhood factors matter in schooling investments: in the face of the availability of a new technology that altered schooling returns, agents learned of the benefits of new returns to schooling from neighbors and adjusted schooling investments over time. Using household data available from the onset of the Green Revolution in India—where in some regions the diffusion of high-yielding varieties (HYVs) affected returns to schooling—the author shows that the schooling distribution of the parents' generation in a neighborhood is important to social learning and household decisions regarding child schooling investments. The study attempts to empirically identify the process of social learning and neighborhood effects on child schooling investments in a Bayesian learning model.

Background

The question of whether agents know of and how fast they respond to return structures poses a fundamental question about how to think about economic development: are observed variations of human-capital accumulation simply a consequence of different return-augmenting mechanisms in perfect information? Or are they a consequence of local environments that affect agents' learning speed under imperfect information? Though the implications of the answers for development policy differ, the questions are not easy to answer through casual observations.

The data for this study consist of farm household panel data from India: the Additional Rural Incomes Survey (ARIS) conducted by the National Council of Applied Economic Research (NCAER) in three crop years, 1968–69, 1969–70, and 1970–71. These years correspond with the onset of the Green Revolution, when at least in some districts, farmers experienced changes in schooling returns.

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Empirical Framework and Strategy

The author constructs a theoretical framework to provide the basis for the empirical analysis. Hypothesizing that agents learn about schooling returns from income difference between educated and uneducated households (schooling return signals), he shows that agents' learning speed is influenced by neighborhood conditions such as income uncertainty and schooling distribution of the parents' generation.

The empirical strategy focuses on specification and identification issues. There are two possible approaches. The first would be to trace the agents' learning and sequential decisionmaking, approximating signals for agents as residuals from profit function—which includes information on unknown returns to schooling. However, by construction, the residual-based return signals may contain unobserved factors that are potentially correlated with education, biasing the returns upward. Or if parents' education is positively correlated with child schooling, it would be easy to infer a positive correlation between the residual-based return signal and child schooling.

Therefore, the author chooses to *directly estimate* schooling returns that agents learn about with which to identify schooling decisions. The basic strategy involves two stages. First is to identify farm profit function, including the effect of education. It is possible to check whether schooling returns had changed when HYV became available in some villages. The author estimates (1) village-specific schooling returns separately for each village, and (2) the impact of HYV adoption on schooling returns, from which to construct village-specific schooling returns.

In the second stage, the author estimates the learning-investment rules with the estimates of schooling return signals constructed from the first stage, incorporating theoretical predictions on neighborhood effects.

Empirical and Simulation Results

The empirical results indicate first that schooling investment is positively correlated with the income difference between educated and uneducated households. This finding is consistent with social learning. Second, schooling distribution of the parents'

generation in a village influences the response of school enrollment to schooling return signals—that is, agents' learning speed—in a manner consistent with theoretical predictions on social learning. Local schooling distribution of the parents' generation has intergenerational externalities to schooling investments in children.

Simulations show that school enrollment rate would increase by about 3 percentage points in five years if the proportion of educated households in a village increased from 0 to 0.53. Since educated households have, on average, a higher income than uneducated households, a disparity of average household income would emerge over the five years. Thus, the initial distribution of schooling, which differs across communities, determines the evolution of income inequality over space.

The analysis also has some aggregate implications: reallocating agents across communities can improve the aggregate response of schooling investments to a change in returns. This economy-wide implication is also quantified based on the estimated parameters.

Discussion and Conclusions

These results clarify the importance of schooling distribution of the parents' generation within a community. Heterogeneity of schooling increases informativeness of the community when it encounters a change in schooling returns, since agents easily compare differentially educated agents. The homogeneous community with few differences in schooling makes it hard to identify the effects of schooling.

To increase learning efficiency in a society, should the educated and uneducated be integrated or segregated by communities? These findings imply that integration of the two populations in a community is more desirable. Intuitively, given that a mixture of the two groups in a neighborhood enables the comparison between the groups, all communities should be heterogeneous. This implication is against a common finding on positive sorting in residential choice behavior. If agents are sorted by their types, including education, in the choice of their residential areas, the population becomes more homogeneous in a community and weakens the response of schooling investments to a change in schooling returns. If social learning effects are not internalized in agents' location choice, the evidence of this paper justifies a socially desirable policy intervention. This implication should not be exclusive to education but could equally apply to issues such as social class and the division of labor.

However, the relevance of the findings in this paper depends on the frequency of structural changes: if the benefit of education generates from situations of disequilibrium such as the Green Revolution, the augmented returns to schooling will eventually decrease as the knowledge of new technologies diffuses evenly and widely in the population.

Keywords: human capital, social learning, neighborhood effects, income risk, schooling distribution, technical change, India

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